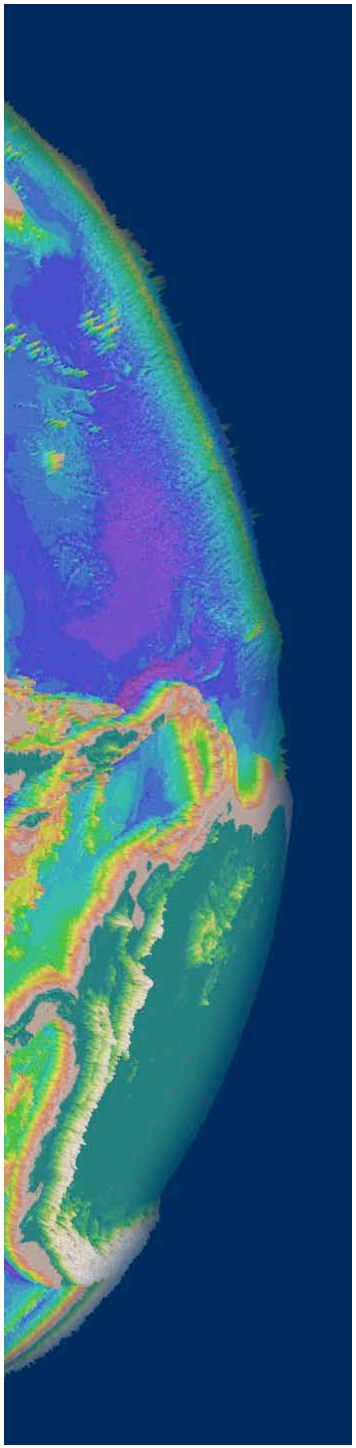


Critical Issues and Objectives for NASA Earth Science and Applications from Space

Sean C. Solomon
Department of Terrestrial Magnetism
Carnegie Institution of Washington

NASA Earth Science and Applications from
Space Strategic Roadmap Committee
26 January 2005

Scientific Challenges for Solid Earth Science

ESE Goal and Leading Solid Earth Science Questions (2000)

Observe, understand, and model the Earth system to learn how it is changing and the consequences for life on Earth.

How is the Earth's surface being transformed and how can such information be used to predict future changes?

What are the motions of the Earth and the Earth's interior, and what information can be inferred about Earth's internal processes?

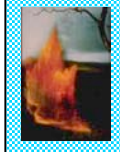
Scientific Challenges Identified by the SESWG (2002)

1. What is the nature of deformation at plate boundaries and what are the implications for earthquake hazards?

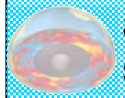
2. How do tectonics and climate interact to shape the Earth's surface and create natural hazards?

3. What are the interactions among ice masses, oceans, and the solid Earth and their implications for sea level change?

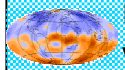
4. How do magmatic systems evolve and under what conditions do volcanoes erupt?



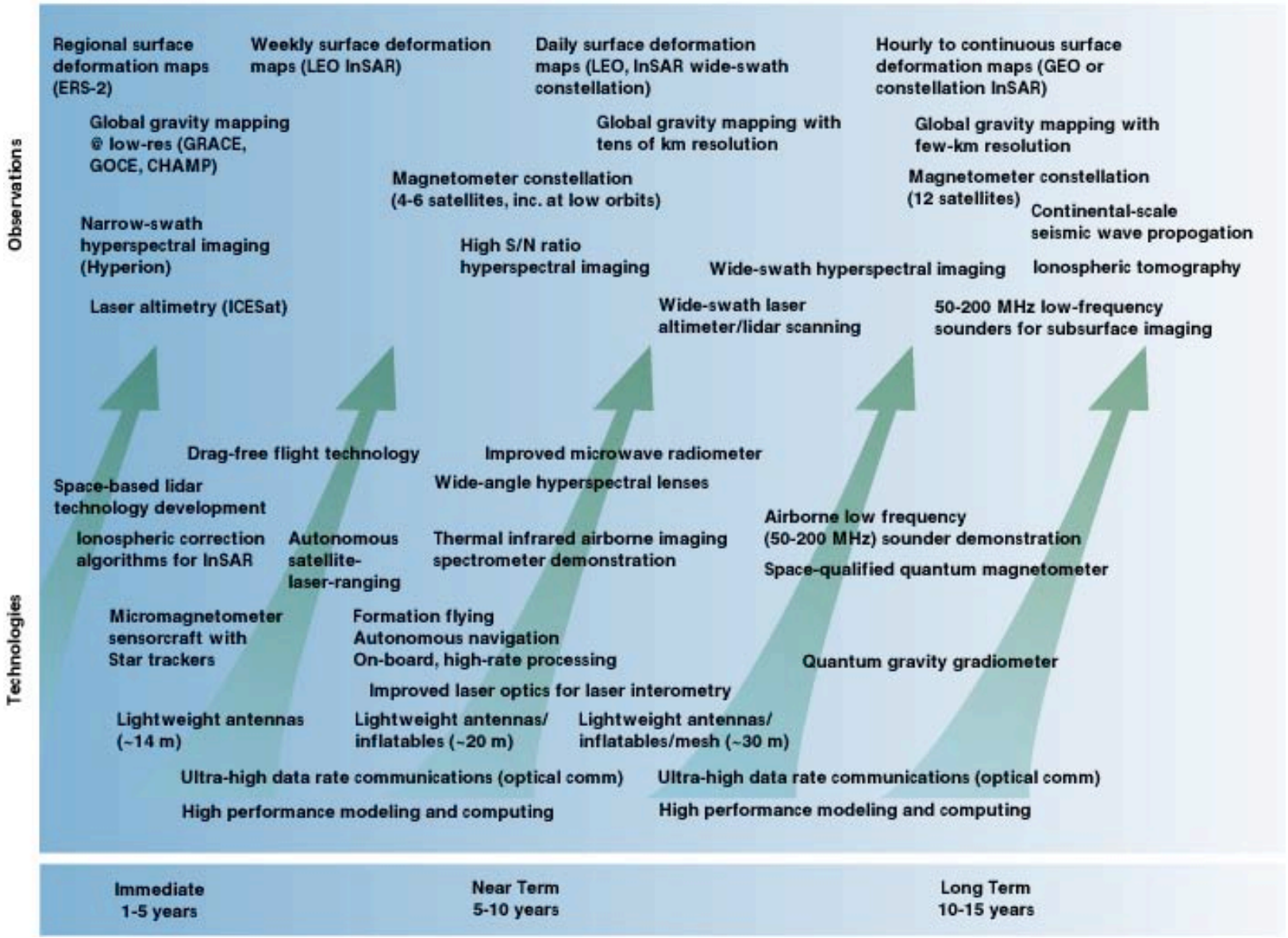
5. What are the dynamics of the mantle and crust and how does the Earth's surface respond?

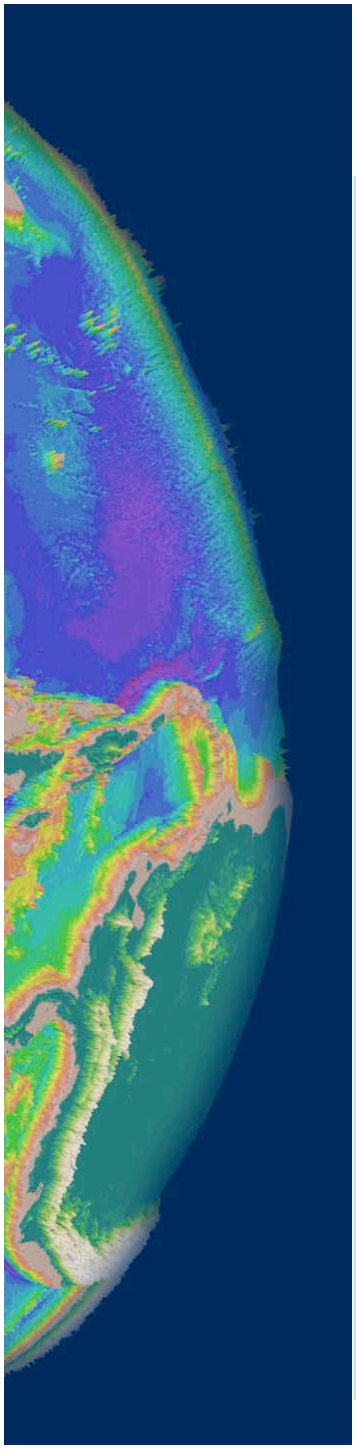


6. What are the dynamics of the Earth's magnetic field and its interactions with the Earth system?



Technology Development Recommended by SESWG





Critical Programmatic Issues

- Leveraging partnerships with other federal agencies (e.g., NOAA, NSF, USGS, DOD).
- Leveraging partnerships with international space agencies (e.g., GRACE, Oersted, CHAMP, SAC-C, Radarsat).
- Integrating technology development opportunities across Earth and space sciences.
- Balancing technological innovation with need for long-term program of synoptic and commandable targeted observations.
- Balancing mission programs with continuing need for investment in R&A, IT, technology, supporting infrastructure, and E/PO.